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# INFO SHEET

## Animal Health Services

United States  
Department of  
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Animal and  
Plant Health  
Inspection  
Service

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## Waste Handling Facilities and Manure Management on U.S. Dairy Operations

Good manure management can be consistent with good cow management. In a recent USDA study, producers of top-producing dairy herds were twice as likely to engage in manure management practices designed to limit environmental impacts of waste handling as were producers of low-producing herds.

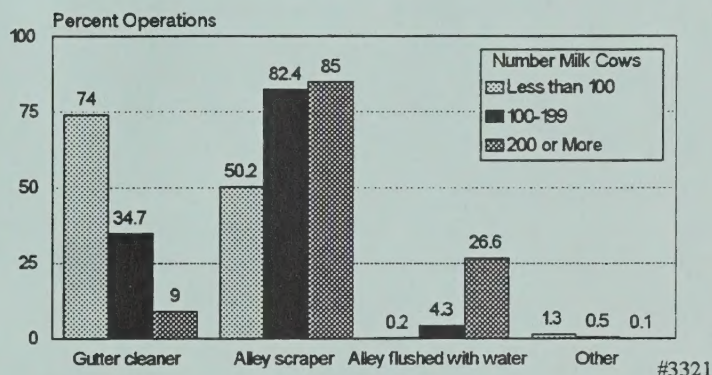
During the planning phase for a National Animal Health Monitoring System (NAHMS) study of the dairy industry, industry representatives asked this USDA program to describe current use of animal waste handling systems. The information would support the dairy industry in responding to public concerns about the environment. The NAHMS Dairy '96 collected data during the second phase of the study from 1,219 producers with 30 or more dairy cows in 20 states<sup>1</sup> that represented 79 percent of the milk cows in the United States.

Almost three-quarters of herds with fewer than 100 dairy cows used gutter cleaners for manure removal (74.0 percent, Figure 1). Gutter cleaner use declined as herd size increased. Use of alley scrapers was common across all herd size groups and was found on over 82 percent of operations with 100 or more cows. Flushing alleys with water was strongly related to herd size. Less than 1 percent of operations with fewer than 100 cows flushed alleys with water, while 26.6 percent of operations with 200 or more cows used this method of manure removal. Of the operations that flushed alleys with water, over half (54.4 percent) recycled their water for multiple flushes.

Most operations with fewer than 100 dairy cows used some form of solid waste storage (79.2 percent, Figure 2). As herd size increased, solid waste storage methods became less common (59.5 percent in operations of 200 or more cows).

Figure 1

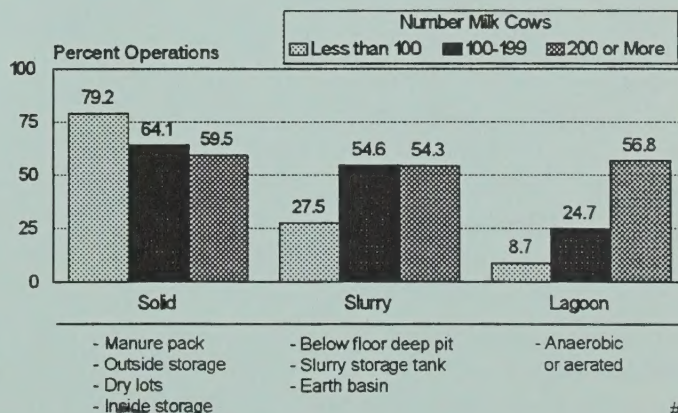
Percent Operations by Method of Removing Manure  
from Cow Housing Areas and Herd Size



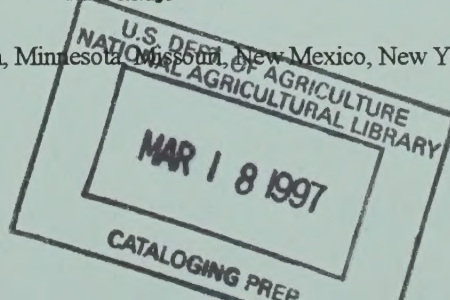
Use of methods for storing manure in a liquid form increased with herd size. The two primary methods are slurry and lagoon. With the slurry method, manure is stored as a thick liquid in a pit under the barn floor or in a tank or earth-basin until it is applied onto land. With lagoons, either anaerobic or aerobic, manure is diluted with water, often from flush systems and milking parlor wash water. Slurry systems were more common than lagoon systems for herds of fewer than 200 cows (Figure 2). Both systems were equally popular among producers with 200 or more

Figure 2

Percent Operations by Method of Storing Manure  
by Herd Size



<sup>1</sup> California, Florida, Idaho, Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, New Mexico, New York, Ohio, Oregon, Pennsylvania, Tennessee, Texas, Vermont, Washington, and Wisconsin.





cows. Over 90 percent of herds with 200 or more cows had some type of liquid manure storage.

Since evaporation reduces total lagoon volume, especially in more arid parts of the country, it is not surprising that lagoons were most common in the western U.S. (Figure 3). Producers with liquid manure systems in the midwest and northeast preferred slurry systems over lagoons.

The most popular method for applying manure to land was use of a solid manure spreader (Figure 4). As herd size increased, so did use of liquid manure disposal systems. For slurry disposal, surface application with a tank wagon was more common in all herd sizes than injecting the manure into the soil.

The Dairy '96 study also assessed management practices associated with minimizing environmental consequences of manure applications. Nearly half (43.2 percent) of the producers who applied manure to land indicated that they established manure application rates based on manure nutrients or crop needs. Less than one-seventh (14.0 percent) of producers analyzed their cows' manure for nutrient content, however. Producers from larger herds (100 or more dairy cows) were more likely to analyze the nutrient content of their manure than their small herd counterparts.

Manure incorporation into soil within 24 hours minimizes odors and nitrogen loss to the atmosphere. Under one in seven producers with fewer than 100 cows (15.8 percent) incorporated their manure into soil within 24 hours. The percentage increased with herd size to over one-third (38.7 percent) of producers with 500 or more cows.

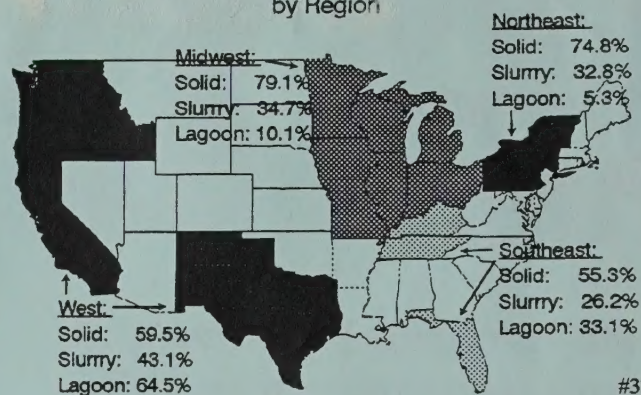
Another way to minimize environmental impacts of manure application is to have buffer zones around waterways and bodies of water where manure is not spread. More than three-quarters (78.1 percent) of producers who spread manure reported having buffer zones of 50 feet or more where manure was not spread.

Manure nutrient analysis, manure application rates based on crop nutrient requirements, manure incorporation, and no-spreading buffer zones around waterways are four management practices designed to limit environmental impacts of waste handling. Most dairy producers (89.4 percent) used one or more of these manure management practices. The relationship between good waste management and good milk production management was analyzed. Dairy producers who used at least three of these waste management practices were placed in one group and those who used fewer than three were placed in another. Producers were also grouped into quartiles by their milk production per cow. Producers in the top per-cow production group were twice as likely to use at least three of the manure management practices than those in the bottom per-cow production group (32.5 percent vs. 14.7 percent).

Many producers spread manure daily (46.5 percent) or weekly (14.7 percent) during the winter. Analysis of those

Figure 3

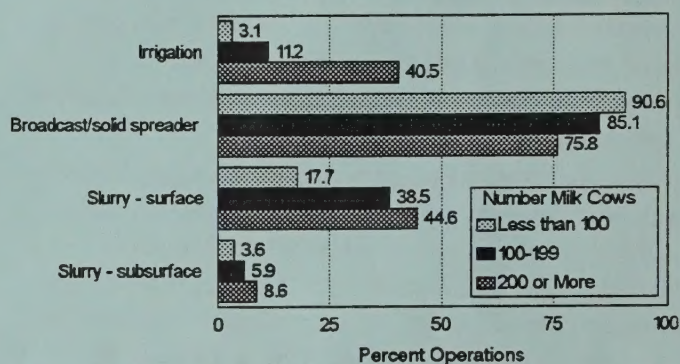
#### Percent Operations by Method of Storing Manure by Region



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Figure 4

#### Percent Operations\* that Used the Following Methods for Manure Application by Herd Size



\*For operations that applied manure on land owned or rented.

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who spread manure showed that operations with gutter cleaners were more than twice as likely to spread manure daily during the winter than those who did not have gutter cleaners. On the other hand, solid manure storage, either outside or in special areas within a building, reduced by one-half the likelihood of daily winter manure spreading. Producers with fewer than 100 cows were more likely to spread manure daily during the winter, even when adjusted for use of gutter cleaners. Also producers in the northeast were more likely to spread manure daily during the winter than those from other parts of the country.

In summary, most dairy producers used at least one management practice designed to limit environmental impacts of dairy waste management and good waste management was not in conflict with milk production per cow.

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